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The New Forward Silicon Vertex Tracker for the PHENIX Experiment at RHIC

I report on the Forward Silicon Vertex Detector upgrade to the PHENIX detector at the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory. The FVTX detector will provide tracking that allows vertex cuts which can distinguish prompt particles from short-lived heavy quark mesons (D and B), and decay particles from long-lived light mesons (pions and kaons). The identified heavy quarks can be used as probes of the dense medium that is created in central Au-Au collisions at RHIC.

The FVTX detector system is comprised of two identical endcap sections. The four disks that comprise a single endcap contain 48 individual wedge shaped towers mounted on a carbon composite support substrate. Each wedge supports silicon sensors with readout chips wire bonded to the sensors. There are over one million instrumented strips in the detector.

The ASIC development Group at Fermi National Laboratory completed the design for the readout chip. The FVTX custom IC is named the FPHX chip. The chip is configured in 128 identical channels. Each channel contains a charge integrator, shaper, programmable threshold, discriminator, and a 7-comparator thermometer ADC with programmable thresholds. The FPHX is designed in data-push architecture. It incorporates simultaneous read/write in a dead time free configuration.

At the time of abstract submission the assembly of the detector is more than half completed, with installation scheduled into the PHENIX experiment by October, 2011. I will report on all important aspects of the detector and electronics design, testing, assembly and commissioning.